King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences

MATH-533: Complex Variables I
Spring Semester 2004 (032)

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Homework # 4

Due: Saturday 17.4.2004

Q1. Give a precise definition of a single-valued branch of $f(z) = \log(\log(z))$ in a suitable region and prove that it's analytic.

Q2. Suppose that $f(z)$ is analytic with $|f(z)^2 - 1| < 1$ in a region Ω. Show that $\mathrm{Re}(f(z)) > 0$ or $\mathrm{Re}(f(z)) < 0$ throughout Ω.

Q3. Show that any linear fractional transformation which transforms the real axis into itself can be written with real coefficients.

Q4. Show that any four distinct points can be carried by a linear fractional transformation to positions $1, -1, k, -k$, where the value of k depends on the points. How many solutions are there and how are they related?

GOOD LUCK